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### The Disciplining Role of Leverage in Dutch Firms

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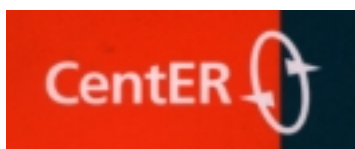
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**THE DISCIPLINING ROLE OF LEVERAGE IN  
DUTCH FIRMS**

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**Discussion paper**

# **THE DISCIPLINING ROLE OF LEVERAGE IN DUTCH FIRMS**

by

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# THE DISCIPLINING ROLE OF LEVERAGE IN DUTCH FIRMS

## Abstract

In this study we investigate the role of leverage in disciplining overinvestment problems. We measure the relationships between leverage, Tobin's  $q$  and corporate governance characteristics for Dutch listed firms. Besides, our empirical analysis tests for determinants of leverage from tax and bankruptcy theories. Representing growth opportunities,  $q$  is expected to be an agency-based determinant of leverage. Simultaneously,  $q$  represents firm value, which is determined by leverage and governance structures. We test a structural equations model in which we deal with this simultaneous nature of the relation between leverage and  $q$ . Our results indicate that Dutch managers avoid the disciplining role of debt, when they are most likely to overinvest. Leverage is mainly determined by tax advantages and bankruptcy costs. In addition, we test the impact of leverage on excess investment. We do not find a difference in the influence of leverage on investment between potential overinvestors and other firms. This confirms that the disciplinary role of leverage in Dutch firms is absent.

# 1 Introduction

This paper investigates the role of leverage as a disciplining device in Dutch firms. When firms have excess cash and low investment opportunities, leverage may serve as a disciplinary device that decreases agency problems between managers and shareholders. Leverage induces the obligation to pay out cash, because the interest payments and the repayments are not at the management's discretion. If the obligations are not met, creditors can have a firm declared bankrupt. The theoretical underpinning of the disciplinary role of leverage stems from Jensen (1986). As a result of agency problems between managers and shareholders, managers may use free cash flows to invest in projects that do not enhance shareholder wealth. Managers benefit from this overinvestment, i.e. investing in projects with negative net present value, because their utility is positively related to firm size. According to Jensen (1986), managers of firms with excess cash and no valuable growth opportunities will increase leverage voluntarily as a bonding device. Leverage can be substituted by other governance mechanisms. Zwiebel (1996) argues that managers will not increase leverage voluntarily. In his view, managers aim to avoid leverage, but can be forced by other governance mechanisms to increase leverage, which serves as the ultimate disciplinary device to reduce overinvestment behavior. Both theories imply that leverage, in its disciplinary role, is closely related to a firm's corporate governance structure.

In comparison with US firms, which are the subject of most existing empirical studies, Dutch firms have very different corporate governance characteristics. In the Netherlands, the market for corporate control is virtually absent, due to the presence of highly effective takeover defenses (see Kabir, Cantrijn and Jeunink (1997)). Besides, many firms have one or more large blockholdings, which may protect the firm from a hostile takeover. Dutch firms have a two-tier board system and multiple relations exist between firms and financial institutions (see De Jong, Dejong, Mertens and Wasley (2001)). Although firms and managers in the US and the Netherlands are the same in nature, they operate in a different setting with respect to corporate governance structures. As governance is related to leverage, a comparison of the two countries may yield a better understanding of the determinants of leverage.

Previous empirical studies either investigate agency problems in the determinants of leverage (see, among others, Titman and Wessels (1988), Smith and Watts (1992), Mehran (1992), Rajan and Zingales (1995) and Berger, Ofek and Yermack (1997)) or in the determinants of Tobin's  $q$  (see, among others, Morck, Shleifer and Vishny (1988), McConnell and Servaes (1990, 1995), Mehran (1995) and Yermack (1996)). In this paper we argue that the theoretical predictions from agency theory suggest that both approaches should be used simultaneously. According to

overinvestment theory, leverage is partially determined by  $q$ , and vice versa. Therefore, in this paper we present a simultaneous test of the determinants of leverage and Tobin's  $q$ . Besides our investigation of the bilateral relationship between leverage and  $q$ , we test a broad set of determinants of leverage and firm value. For leverage we include, next to  $q$ , proxies for tax and bankruptcy explanations and corporate governance characteristics. As determinants of firm value we include, next to leverage, corporate governance characteristics, because value may be influenced directly by these devices. We also explicitly test for overinvestment behavior by measuring excess investment and its determinants. If the disciplinary role of leverage is present, we expect that leverage reduces investment mostly in firms that are likely to overinvest.

We find that Dutch firms avoid the disciplining role of leverage, when their managers are most likely to overinvest. In the determinants of leverage, significantly lower leverage is found in the sub set of potential overinvestment firms, i.e. firms with both low Tobin's  $q$  and high free cash flow. Moreover, no confirmation is found for a negative impact of  $q$  and a positive impact of free cash flow. These findings contrast with US studies, such as Smith and Watts (1992), in which the negative impact of  $q$  on leverage is confirmed. Governance mechanisms hardly induce leverage, which indicates that disciplinary forces from governance do not stimulate the disciplining role of leverage. The results confirm earlier findings of De Jong and Veld (2001) in study of debt and equity issues by Dutch firms. The results of this study confirm the importance for leverage of the trade-off between tax benefits and bankruptcy costs. More specifically, tax benefits are consistent with the negative influence on leverage by non-debt tax shields. Bankruptcy costs are confirmed by the negative impact of business risk on leverage and by the positive impact of tangible assets and firm size. We find that leverage has a significantly negative influence on Tobin's  $q$ , which is an approximation of firm value. Additionally, our investigation of the determinants of excess investment shows that leverage reduces investment. This effect is relevant for the full set of firms and not specific to the potential overinvestors. Therefore, the analysis of excess investment confirms that the disciplinary role of leverage is not driving this negative effect, because the effect is not exclusively present in the sub sample of potential overinvestors.

This paper continues as follows. In section 2 the hypotheses of this paper are defined. In section 3 the data set is described. The empirical analysis is described in section 4. In section 5 we relate our results for leverage and  $q$  to actual investment behavior. The conclusions are in section 6.

## 2 Hypotheses

In Modigliani and Miller (1958), under stringent assumptions, the optimal amount of leverage is found to be irrelevant to the value of the firm. In subsequent studies, these assumptions are relaxed and a framework is developed in which a number of firm characteristics determine the optimal amount of leverage. We test the implications of these corporate taxation and bankruptcy theories of leverage. Moreover, in this paper we investigate an agency theory of leverage in which growth opportunities, free cash flow and corporate governance play an important role, i.e. the overinvestment problem.<sup>1</sup> From this theory we can induce hypotheses for specific determinants of leverage. This theory also leads to the hypothesis that leverage influences firm value. Besides, governance characteristics are predicted to influence firm value. This brief overview shows that our empirical model covers determinants of both leverage and firms value. The hypotheses are summarized in Table 1.

[Insert Table 1 here]

In Table 1, column (1) lists the theories and determinants that are investigated in this paper. The theories predict that the determinants explain two firm characteristics, i.e. leverage and firm value. The hypotheses 1 to 10 concern the determinants of leverage and are in column (2). The hypotheses on firm value are 11 and 12, which are found in column (3). It should be noted that the determinant called governance mechanisms can be divided into several more specific determinants, such as insider shareholdings, the market for corporate control, board structure, ownership structure and relationships with financial institutions.<sup>2</sup> In the remainder of this subsection we will discuss the hypotheses in Table 1.

The first group of theories are the tax benefits of leverage. Corporate taxes are introduced into the static framework by Modigliani and Miller (1963). If interest payments are tax-deductible, firms will prefer debt over equity. A refinement is brought in by DeAngelo and Masulis (1980). The deductibility of interest is affected by the existence of other tax shields than interest. The resulting hypotheses are that taxes induce leverage and that the crowding-out effect of non-debt tax shields reduce the benefits of leverage. Therefore, non-debt tax shields affect leverage negatively (*Hypothesis 1*).<sup>3</sup> While taxes induce leverage, bankruptcy costs have the opposite effect. Therefore, bankruptcy costs are the second group of theories tested. The payments on debt are obligatory, whereas the dividend payments on equity are left to the discretion of the management. The lenders can ask for bankruptcy in case the firm fails to repay. The collateral value of assets may reduce bankruptcy costs to bondholders and is expected to increase leverage (*Hypothesis 2*). Because the

likelihood of bankruptcy increases with leverage, firms with higher business risk are expected to have less debt (*Hypothesis 3*). Besides, firm size reduces bankruptcy costs, because larger firms are less likely to go bankrupt, for example as a result of more diversified activities (*Hypothesis 4*).<sup>4</sup>

Jensen (1986) sketches a setting in which professional managers of a firm derive personal benefits from expanding the size of the firm. Because these managers are no or partial owners, they have incentives to cause their firm to grow beyond the optimal size and to accept projects with a negative net present value. These incentives are caused by the desire to have, among others, power, status, salary and bonuses. Jensen (1986) defines free cash flow as the cash flow in excess of the cash flow required to fund all projects with a positive net present value that are available to the firm. It is in the best interest of the shareholders to return the free cash flows to the shareholders, for example as dividends. However, the payment of dividends is at the management's discretion and managers have incentives to retain earnings to be used for further expansion. This problem is referred to as the overinvestment problem. According to Jensen (1986), the overinvestment problem can be reduced by issuing debt. Contrary to equity, the pay-out on debt does not have a discretionary nature. The presence of debt causes the management to pay out cash flow as interest and repayments. Moreover, the bondholders will have the firm declared bankrupt if a firm would overinvest and, as a result, cannot pay the interest or fails to repay the debt. Thus, the benefits of the leverage to the firm are that managers will reduce the overinvestment behavior as a result of the threat of bankruptcy. This role of debt is referred to as the disciplining role of leverage. The theory of Jensen (1986) predicts that managers of firms that are more likely to overinvest, voluntarily issue debt as a bonding device, i.e. the leverage is self-imposed. Grossman and Hart (1982) provide a formal model for this disciplining role of leverage.<sup>5</sup> The empirical implications of Jensen (1986) and Grossman and Hart (1982) are that managers of firms without growth opportunities and with the presence of free cash flow are potential overinvestors. These firms will have more leverage, because its disciplinary role is valuable to the firm. Therefore, leverage is expected to be negatively related to growth opportunities (*Hypothesis 5*).<sup>6</sup> Similarly, leverage is positively related to free cash flow (*Hypothesis 6*). In case corporate governance structures are effective in reducing agency problems between managers and shareholders, they decrease the necessity of debt as a disciplining device. A substitution effect arises in which effective governance is a substitute for leverage (*Hypothesis 7*). Simultaneously, agency costs are reduced as a result of the presence of leverage in firms without growth options and with free cash flow, which increases firm value. The disciplining role of leverage affects firm value positively because leverage enhances the efficiency and performance of firms (*Hypothesis 11*). Of course, effective governance mechanisms, other than leverage, will enhance firm value directly. (*Hypothesis 12*).



The theories of Jensen (1986) and Grossman and Hart (1982) are based on the assumption that managers have incentives to bond themselves through leverage. Contrary to these theories, Zwiebel (1996) and Novaes and Zingales (1995) have explicitly modeled the incentives for managers to engage in debt. In Zwiebel's (1996) model, the goal of managers is to expand the firm and to retain control. In his model, the market for corporate control serves as an initial disciplining force.<sup>7</sup> The threat of a takeover forces managers to issue debt as a bonding device, in order to prevent the loss of control to a competing management team. By issuing debt, managers pre-commit to forego negative present value projects, because debt increases the risk of bankruptcy due to overinvestment. Simultaneously, managers aim to avoid debt, because it increases the probability of bankruptcy and thus the loss of control. Zwiebel (1996) argues that leverage is the ultimate disciplining device and that managers are forced to increase leverage by other disciplinary devices, such as the market for corporate control. The managers trade off costs and benefits of debt. This implies that managers balance personal bankruptcy costs (due to debt) and a loss of control resulting from disciplining by alternative governance devices (due to debt-avoidance). For the disciplinary role of leverage to be effective, the models of Zwiebel (1996) and Novaes and Zingales (1995) require the presence of an initial governance device that forces the manager to engage in leverage. Leverage serves as the ultimate disciplining device. The studies have important implications for firms in case of weak disciplinary forces, i.e. ineffective governance. In this case, managers are highly unlikely to lose control as a result of governance mechanisms. Managers will avoid debt, because the benefits of bonding with debt are relatively low. The empirical implications are that firms with low growth opportunities and free cash flow will avoid debt. Growth opportunities are expected to have a non-negative impact (*Hypothesis 8*). Similarly, free cash flow is expected to have a non-positive impact (*Hypothesis 9*). Effective governance, through incentives or control, forces managers to increase leverage (*Hypothesis 10*). Thus, the extent to which they can avoid debt depends on corporate governance characteristics. This implies that, in case managers try to avoid debt, incentive and control structures will induce leverage. In contrast with Jensen's (1986) voluntarily bonding, stronger incentives and control do no longer substitute the disciplining role of debt. Instead, these governance devices force managers to issue debt. In column (3), the determinants of firm value are mentioned. In both overinvestment theories, the disciplining role of leverage affects firm value positively (*Hypothesis 11*). Alternative governance characteristics, i.e. effective incentive and control structures, are expected to influence firm value positively (*Hypothesis 12*).

## 3 Data set and proxies

### 3.1 Introduction

In this paper we investigate a sample of Dutch listed firms. The data set contains information on the financial structure, the asset structure and the governance structure of non-financial firms listed at the Amsterdam Exchanges from 1992 until 1997. We choose non-financial firms because these firms are different from financial firms due to regulation and the nature of the activities. In subsection 3.2 we will describe the data sources. In subsections 3.3 and 3.4 we will define our proxies for financial variables and for governance variables, respectively.

### 3.2 Data sources

The financial and asset structure data are obtained from the 1992/1993 to 1998/1999 issues of the Yearbook of Dutch Firms (*Jaarboek Nederlandse Ondernemingen*). In addition, we use a data base of Statistics Netherlands (*Centraal Bureau voor de Statistiek*) with annual report data on listed firms from 1974 to 1997 for the calculation of the replacement values of total assets. The ownership structure data is obtained from the leading Dutch financial daily newspaper, *Het Financieele Dagblad*, which publishes each year a list of exchange-listed firms and the stakeholders, according to the notifications for *Wet Melding Zeggenschap* (WMZ).<sup>8</sup> Technical takeover defenses and cross-listings are from the yearly overviews of 1992 to 1997 of all securities listed at the Amsterdam Exchanges (*Gids bij de officiële prijscourant van de Amsterdamse Effectenbeurs*). The data of the board structures are obtained from the 1991/1992 to 1996/1997 issues of the Yearbook of Dutch Firms (*Jaarboek Nederlandse Ondernemingen*), which contain a list of board members. The list includes the firms in our data set and Dutch financial institutions. We use this source to obtain board size and joint board members of industrial firms and financial institutions. We use board data and WMZ-notifications to measure managerial shareholdings.<sup>9</sup> The information on the adoption of the structure regime is obtained from the report *Monitoring Corporate Governance in Nederland 1997* and the firms' annual reports. We include firm-years for which complete data is available. In total, we have 665 firm-year observations for 132 firms in the 1992-1997 period.

### 3.3 Financial variables

In this subsection we will describe the financial variables in our data set.

*Capital structure.* Leverage is measured as long-term debt divided by the book value of total assets. The choice for a book value measure of leverage above a market value measure has two reasons. First, as argued by Titman and Wessels (1988), a market value measure induces spurious

correlation with market-to-book ratios, such as Tobin's  $q$ . In case managers choose debt levels in book values, differences in market values will not necessarily be reflected in the debt ratio. However, if we measure the debt ratio in market values, then the differences in market value will be reflected in the debt ratio. Even without a causal relationship between the market-to-book ratio and the market value debt ratio, a negative relationship will be measured. A second and related reason for the use of a book value measure of leverage is provided by Cools (1993). In interviews with 50 Dutch CFOs, all respondents indicated that the capital structure is measured in book values. Of all respondents, 74% cannot mention a reason and many consider the question 'absurd' or 'difficult to understand' (Cools, 1993, p.270). The remaining 26% of the respondents find market values too volatile to be used as a measure. The preference for long-term debt above total debt is driven by the nature of short-term debt and the availability of data. For example, according to the data of Statistics Netherlands over 1995, the amount of short-term debt was composed of short-term repayment on long-term debt (7.0%), credit institutions (10.8%), trade-credit (30.2%) and other sources (52.1%). Trade-credit is largely used and has specific relations with the firms' activities. The large fraction of undefined (other sources) short-term debt makes this variable difficult to interpret.

*Tobin's  $q$ .* A key variable in this study is Tobin's  $q$ , i.e. the market value of the firm divided by the replacement value of the assets. As discussed in the introduction, Tobin's  $q$  represents two key concepts. The first concept is *growth opportunities*, defined as the market's expectation of the value of future projects, over which the management has discretion. Myers (1977) defines growth opportunities ( $V_G$ ) as follows: 'The usual interpretation is that a positive value of  $V_G$  reflects future investments which are expected to yield a rate of return in excess of the opportunity cost of capital' (p.150). According to Tobin (1978), the marginal  $q$  ratio '.. represents the comparison between, on the one hand, the marginal efficiency of capital, the internal rate of return on investment at its cost in the commodity market and on the other, the financial cost of capital, the rate at which investors discount the future returns from such investment.' (p.423). The similarity between these definitions is striking implying that the  $q$  ratio of Tobin is a close representation of growth opportunities.<sup>10</sup> The second concept that Tobin's  $q$  represents is *firm value*. This measure of efficiency and performance estimates the value of a specific firm relative to the value of the assets, without the bundling into the specific firm. Tobin's  $q$  measures managerial efficiency and abilities that generate additional value from existing assets by producing goods and services efficiently. As an approximation of firm value, Tobin's  $q$  includes the value and profitability of the future projects and the ability to minimize agency costs.

The approximation of Tobin's  $q$  in this study is described by Perfect and Wiles (1994). In the Netherlands, firms either present replacement values directly in their annual reports, or they present

historical costs. If replacement values are presented no adjustment is made. In case of historical costs we have to adjust the value to approximate the replacement value. This is relevant for plant and equipment. We assume that in a base year the replacement value equals the historical costs. For each subsequent year we adjust this replacement value by adding new investments and corrections for the growth in capital good prices and subtracting depreciation. The base year is 1974 or the first year for which firm data is available. Growth in capital good prices is based upon the price index of investment goods, as provided by the Statistics Netherlands. The replacement value of the assets is the book value of assets plus the difference between the replacement value and historical value of plant and equipment.<sup>11</sup>

*Other variables.* Non-debt tax shields are approximated using the direct estimate provided by Titman and Wessels (1988), i.e. operating income, minus interest payments, and minus tax payments over the corporate tax rate. We measure non-debt tax shields relative to total assets. Tangible assets is tangible fixed assets plus inventory, over total assets. Business risk is measured as the standard deviation of the change in operating income over a five-year period.<sup>12</sup> For size we include the book value of total assets. For free cash flow we use the proxy introduced by Lehn and Poulsen (1989).<sup>13</sup> The variable is defined as operating income minus taxes, interest expenditures and dividends paid, divided by total assets. Growth of total assets is defined as the historical three-year growth rate of the book value of the firm's assets. We include a dummy variable listing in UK/US with the value of one if the firm is listed in the United States, United Kingdom, or both, and zero otherwise. Finally, we include a dummy variable potential overinvestment with the value of one if the firm has the potential to overinvest, and zero otherwise. For a firm-year to qualify as potential overinvestment, this firm-year has to meet two requirements. First, the Tobin's  $q$  of the firm-year has to be *below* the median  $q$  for all firms in that specific year. Second, the free cash flow of the firm-year has to be *above* the median free cash flow for all firms in that specific year.

### 3.4 Corporate governance variables

In this subsection we will describe the governance variables in this study and we will discuss the specifics of the Dutch institutional setting.

*Board structure.* The board structure may serve as a disciplinary device if an executive or management board is controlled by a supervisory board (Fama and Jensen (1983)). Thus, the board structure is strongly dependent on the corporate system (Moerland (1995)). In the Netherlands, listed firms have two-tier boards, which consist of a managerial board (*Raad van Bestuur*) and a supervisory board (*Raad van Commissarissen*). The effectiveness of the supervisory board is influenced by the power and independence of the supervisory board. We define board size as the

total number of board members of both boards. Supervisory board size is the number of members of the supervisory board. The power of the supervisory board is measured as relative supervisory board size, which is the number of supervisory board members over total board size. An important determinant of board independence is the number of interlocking directorates, i.e. board members of a firm who are also board members for another firm.<sup>14</sup> Interlocking directorates (interlocks) are defined as the number of board members of a firm, that are also board members for another firm. Managerial (supervisory) board interlocks is the number of interlocking directorates of managerial (supervisory) board members over the total number of managerial (supervisory) board members. Interlocks with financial firms are measured as the number of interlocking directorates of a firm with financial institutions. A crucial determinant of the power of the supervisory board that is specific to the Dutch setting is the structured regime (*structuurregime*), which delegates specific shareholders' rights to the supervisory board.<sup>15</sup> If a Dutch firm has a subscribed capital of at least 25 million guilders, at least 100 employees in the Netherlands and a works council, the structured regime is compulsory. For these firms, the supervisory board members are appointed by means of cooptation (current members elect new members). The members of the managerial board are appointed and dismissed by the supervisory board. The supervisory board also establishes the annual statement of accounts. Finally, the supervisory board has to approve important decisions of the managerial board. If a company fulfills the three criteria, but a majority of the work force is employed abroad, the structured regime is not compulsory. However, firms that do not meet the requirements or have a majority of the employees abroad may choose to adopt the structural model voluntarily. The structured regime may enhance board effectiveness because the power and the independence of supervisory board members is increased. On the contrary, shareholders' rights are reduced, which may reduce the effectiveness of this governance mechanism. We include a dummy variable compulsory (voluntarily) structured regime with the value of one, if the firm has adopted the structured regime compulsory (voluntarily), and zero otherwise.

*Takeover defenses.* The market for corporate control is an external control mechanism, resulting from the threat of a loss of control through a hostile takeover (Jensen and Ruback (1983)). In case of an active market for corporate control, managers cannot indulge in overinvestment, because this will lead to a loss of control. The efficacy of this mechanism depends on the presence of anti-takeover defenses, whereas these defenses can allow the management to entrench themselves against (the threat of) a hostile takeover. In the Netherlands, most firms have multiple highly effective takeover defenses. As a result of these defenses, among others, hostile takeovers are rare in the Netherlands. For example, in the period 1992-1997, no Dutch listed firm was taken over without managerial approval. The three most prevailing defenses are preferred shares, priority shares and

depository receipts.<sup>16</sup> Firms that have preferred shares have an arrangement that allows an issue of preferred shares without further approval of shareholders and for which only 25% of the nominal value has to be paid up. In case of a takeover attempt, the firm can place these shares with a befriended party and have the shares paid with debt. The dilution creates an effective takeover defense. Priority shares are a small number of shares that carry superior voting rights, e.g. with regard to takeover attempts. For firms with depository receipts, the shareholders own receipts which only carry the cash flow rights. The voting rights remain with a trust that owns the shares and issued the receipts. We include three dummy variables, with a value of one in case of the presence of respectively priority shares, preferred shares and depository receipts, and zero otherwise. The number of takeover defenses is defined as the number of arrangements the firms has from the following list: priority shares, preferred shares and depository receipts.

*Ownership structure.* The firm's ownership structure may induce monitoring, either through the concentration or through the identity of the shareholders. Shleifer and Vishny (1986) argue that large shareholders have the incentives and the power to control the management. On the contrary, large blockholders may have strategic interests in the firm, which are not aligned with the interests of other shareholders. These blockholders may protect ineffective managers in order to extract wealth from other (minority) shareholders (Becht and Röell (1999)). The identity of the large shareholders may also matter, i.e. shareholders with professional skills are expected to be better monitors. Financial institutions, such as banks, insurance companies and pension funds, are a specific group of stakeholders, which may monitor managers. Relationships with financial institutions are varied, i.e. they may be shareholders, bondholders and suppliers of several financial services. Besides, board members of institutions can be representatives in the boards of firms (interlocking directorships). Because of this broad range of interests and influences, financial firms may be excellent monitors. In contrast, because of the multiple interests of financial firms, these firms may collude with managers and abstain from monitoring. Also, financial firms may simply forego their role as monitors. Because the Dutch Law on Disclosure of Shareholdings requires the notification of shareholdings when thresholds of 5%, 10%, 25%, 50%, or 66,7% are passed, we do not have information of shareholdings below 5%. We define  $C_1$  as the percentage of shares held by the largest blockholder, other than board members. Similarly,  $C_3$  is the percentage of shares held by the three largest blockholders, other than board members. Shareholdings of the managerial and supervisory board measure the shareholdings of the firm's board members. Shareholdings financial firms is the sum of blockholdings by banks, insurance companies, pension funds and venture capitalists. Shareholdings industrial firms is the percentage of shares held by industrial companies.

## 4 Determinants of leverage and Tobin's $q$

### 4.1 Introduction

In this section we empirically test the theoretical hypotheses concerning the overinvestment problem that involve relationships between leverage and Tobin's  $q$ . In subsection 4.2 we will describe the empirical design of this paper. In subsection 4.3 we provide summary statistics. The focus of subsection 4.4 is on the determinants of leverage and Tobin's  $q$ . In subsection 4.5 we discuss robustness analyses.

### 4.2 Empirical design

The hypotheses in Table 1 concern determinants of leverage and firm value. In order to test these hypotheses we specify an empirical model that deals with the specific elements of the underlying theory. An issue that requires attention is the role of leverage and Tobin's  $q$ . Leverage is both an explanatory variable of firm value and an explained variable. Also Tobin's  $q$  is an explanatory and explained variable, as a result of the dual role of  $q$  as growth opportunities and firm value. This implies that both leverage and Tobin's  $q$  are endogenous variables in our model.

In the capital structure literature (see, among others, Smith and Watts (1992)) leverage is normally treated as endogenous, while Tobin's  $q$  is assumed to be exogenous. On the other hand, McConnell and Servaes (1995) and related studies, that investigate the determinants of Tobin's  $q$ , assume that  $q$  is endogenous, while leverage is exogenous. We incorporate both approaches by defining a model consisting of two equations. In the first equation, leverage is explained by Tobin's  $q$ , free cash flow, corporate governance characteristics and control variables. This equation tests the hypotheses for the determinants of leverage (see column (2) in Table 1). In the second equation Tobin's  $q$  is explained by leverage, corporate governance characteristics and control variables. This equation tests the hypothesized determinants of firm value (see column (3) in Table 1). Formally, the two equations are:

$$Leverage_{it} = \mathbf{b}_{10} + \mathbf{b}_{11}'Control_{1it} + \mathbf{b}_{12}Tobinq_{it} + \mathbf{b}_{13}Fcf_{it} + \mathbf{b}_{14}'Gov_{it} + \mathbf{e}_{1it} \quad \text{and} \quad (1)$$

$$Tobinq_{it} = \mathbf{b}_{20} + \mathbf{b}_{21}'Control_{2it} + \mathbf{b}_{22}Leverage_{it} + \mathbf{b}_{23}'Gov_{it} + \mathbf{e}_{2it}, \quad (2)$$

in which the subscript  $it$  refers to firm  $i$  in year  $t$ . *Leverage* is the long-term debt ratio; *Control*<sub>1</sub> is a matrix of control variables consisting of dummy variables for the years 1993 to 1997, non-debt tax shields, tangible assets, the standard deviation of operating income and the logarithm of total assets; *Tobinq* is Tobin's  $q$ ; *Fcf* is free cash flow; *Gov* is a matrix of thirteen governance variables; and

$Control_2$  is a matrix of control variables consisting of dummy variables for the years 1993 to 1997, the logarithm of total assets, the logarithm of one plus the growth rate and a dummy variable for a listing in the US or UK.  $b_{10}$  and  $b_{20}$  are the intercepts;  $e_1$  and  $e_2$  are the error terms;  $b_{11}$ ,  $b_{14}$ ,  $b_{21}$  and  $b_{23}$  are vectors of coefficients; and  $b_{12}$ ,  $b_{13}$  and  $b_{22}$  are coefficients.

The two equations in our model cannot be estimated separately with ordinary least squares (OLS) estimations. The reason is that, in order to obtain unbiased consistent estimates, the error term should not be correlated with the explanatory variables. Thus, all explanatory variables should be determined outside the system or pre-determined. In our model this assumption is not likely to hold, because theory predicts that leverage and Tobin's  $q$  are endogenous. Therefore, it is not appropriate to assume that the error term in the equation (1) is uncorrelated with Tobin's  $q$  and that the error term of equation (2) is uncorrelated with leverage. Using OLS will yield biased and inconsistent estimates. Therefore, we use two-stage least squares (2SLS) regressions in which the joint estimation of equations (1) and (2) includes a correction for the endogeneity of leverage and Tobin's  $q$  (see Verbeek (2000, p.122-139)).

In the empirical finance literature, Bathala, Moon and Rao (1994) test a structural model with equations for leverage and insider shareholdings using 2SLS. A comparison with OLS results learns that a negative influence of insider holdings on leverage is only found using 2SLS, while other results are similar. Chauvin and Hirschey (1996) use 2SLS to test a model with equations for leverage, ownership concentration and institutional shareholdings. The results with OLS estimates are similar. These two examples indicate that OLS may involve misspecification that is corrected by 2SLS. However, the endogeneity problem may also be of minor importance and OLS and 2SLS results will be highly similar.<sup>17</sup>

Our data set consists of pooled data with multiple observations per firm, which induces the presence of autocorrelation. Due to this autocorrelation, 2SLS and OLS estimates of the standard errors, would underestimate the standard errors and overestimate the  $t$ -values. In order to correct the standard errors (and  $t$ -values) we use in our 2SLS regressions GMM-estimations using the Newey-West heteroskedasticity and autocorrelation consistent covariance matrix (Newey and West (1987)). The Newey-West covariance matrix corrects for the presence of both heteroskedasticity and autocorrelation in the error terms.

### 4.3 Summary statistics

In Table 2 we present summary statistics for our sample of Dutch listed non-financial firms over the 1992-1997 period.



[Insert Table 2 here]

The results in Table 2, in comparison with the findings of Rajan and Zingales (1995), indicate that the average long-term debt ratio in the Netherlands of 0.13 is relatively low in comparison with the US and Canada. Rajan and Zingales (1995, p.1428) correct for accounting differences, and report for 1991 long-term debt ratios in book value of 0.23 for the US and 0.28 for Canada. However, Germany (0.10), France (0.16), Italy (0.12) and the UK (0.12) also have lower debt ratios. In Japan, the average debt ratio was 0.19.

The board structure of Dutch firms is characterized by the two-tier boards. On average, the supervisory board consists of 5.2 persons, while the total board has 8.1 members. Supervisory board members serve on average on 1.11 other boards. For managerial board members, the corresponding number is 0.25. Over 68% of the firms are under the structured regime and 8.7% of the firms voluntarily adopted this regime. Shareholdings by supervisory board members are on average 2.62%, while managerial board members hold on average 3.75%. The data concerning takeover defenses shows that on average firms have 1.42 defenses and that the median firm has two defense measures. The description of the takeover defenses in Section 3 showed that each of the defenses is highly effective. The ownership structure data shows that the largest outside blockholder owns on average 24.03%, while the three largest outside blockholders own 36.93% (both measured over all firms). Industrial firms hold on average 9.98%. Institutional shareholdings in the Netherlands are on average 11.05%. Prowse (1995) reports for 1990 that in the US 30.4%, in the UK 52.8%, in Japan 48.0% and in Germany 22.0% is owned by financial institutions. This indicates that institutional shareholdings are relatively low in the Netherlands.<sup>18</sup> The average number of board interlocks with financial firms is 1.81 and the median firm has one interlocking directorate with a Dutch financial institution.

We define firms with potential overinvestment behavior as firms with both Tobin's  $q$  below the median and free cash flow above the median. In total, 14.59% of the firm-years are qualified as potential overinvestment. In the appendix we compare the firm characteristics of these firms and other firms. The comparison shows that potential overinvestors have significantly (at least at the 5% level) less leverage, more non-debt tax shields, larger relative supervisory board size and higher shareholdings by financials. Overinvestors are more likely to have a compulsory structured regime and less likely to have adopted this regime voluntarily (significant at the 1% level).

#### **4.4 Determinants of leverage and Tobin's $q$**

We investigate determinants of leverage and Tobin's  $q$  using 2SLS regressions for the joint estimation of equations (1) and (2). The results are presented in Tables 3 and 4. Initially, in Table 3, we will

describe the impact of the control variables. Therefore, Table 3 contains the regression results of equations (1) and (2) without the governance variables. We will introduce the governance variables in Table 4. We will also discuss the results on the explanatory variables leverage,  $q$  and free cash flow after Table 4.

[Insert Table 3 here]

The results for the determinants of leverage in column (1a) show that non-debt tax shields have a negative impact on leverage, which is significant at the 5% level. This finding confirms that non-debt tax shields have a crowding-out effect of tax advantages of leverage. The relevance of bankruptcy costs is confirmed by the results for the proxies for collateral value and business risk. We find a positive influence of tangible assets (significant at the 1% level) and a negative impact of the business risk (standard deviation of operating income; significant at the 5% level), respectively. The coefficient for Tobin's  $q$  is significantly positive at the 5% level and free cash flow has no significant impact on leverage.

In column (1b) we present the determinants of firm value, i.e. Tobin's  $q$ . As control variables we include firm size, historical growth and the dummy for cross-listings. The results in column (1b) confirm the relevance of the control variables. Firm size has a negative coefficient, significant at the 5% level. Historical growth and cross-listing both have positive coefficients, which are significant at the 1% level. Leverage is negatively related to Tobin's  $q$ , significant at the 1% level.

In column (2a) we include total assets as a measure for firm size, which is significantly positive at the 1% level. This finding confirms our hypothesis that firm size decreases bankruptcy costs. The addition of firm size alters the influence of business risk, as the coefficient for the standard deviation of operating income becomes insignificant. Apparently, the negative impact of business risk is encompassed by the size effect. The results in column (2b) do not differ from the findings in column (1b).

Our findings in columns (1a) and (2a) confirm the tax and bankruptcy hypotheses and resemble the earlier findings for Dutch firms of Cools (1993) and results for G-7 countries by Rajan and Zingales (1995).<sup>19</sup> Our control variables for the Tobin's  $q$  equation seem relevant. For a test of the overinvestment theories we have to consider leverage,  $q$ , free cash flow and governance. So far, we did not include governance characteristics in our analysis. In Table 4 we present two models in which governance is included.

[Insert Table 4 here]

In columns (1a) and (1b) we precisely estimate equations (1) and (2) as we include governance characteristics as determinants of leverage and Tobin's  $q$ , respectively. The findings in column (1a) show that Tobin's  $q$  and free cash do not significantly influence leverage. This contrasts with voluntarily disciplining and is in line with debt-avoidance. The insignificant results imply that firms that would benefit from additional disciplining from leverage, because they have few growth options and free cash flow, do not have more leverage than other firms. Apparently, the firms that can benefit from leverage choose to avoid debt. It is striking that in column (1a) only two out of thirteen governance variables are significant. We find that the voluntarily adopted structured regime has a positive impact on leverage (significant at the 10% level). Besides, shareholdings of financial firms negatively influence leverage (significant at the 10% level). Because we find evidence for debt-avoidance and not for self-imposed debt, the results for financial firms imply that financial firms are ineffective monitors. Similarly, the voluntarily adopted structured regime yields effective monitoring.<sup>20,21</sup>

In column (1b), the influence of leverage and governance on firm value is described. Leverage is found to have a significantly negative impact on firm value. This result contrasts with a disciplining and value-enhancing role for leverage. Among the governance characteristics the relative supervisory board size shows a negative coefficient, significant at the 10% level. Interlocking directorates of supervisory board members have a positive impact, significant at the 5% level. The other variables for board structure are insignificant. These findings imply that the size of the supervisory board has a negative impact, while interlocks are positive, probably because of the skills and networking abilities of these board members. The coefficients of the takeover defenses and ownership variables are insignificant. Financial firms have a negative impact on firm value. The coefficient for their shareholdings is significant at the 5% level and the coefficient for interlocks is insignificant, with a  $t$ -value of -1.56. This negative impact of financial firms is in line with the finding that shareholdings by financials affect leverage negatively.<sup>22</sup>

In column (2a) we add a dummy variable for overinvestment, indicating both low growth opportunities and high free cash flow. The coefficient has a significant (at the 10% level) negative sign, which shows that Dutch firms avoid leverage if they are potential overinvestors. Managers of firms that would benefit most from leverage choose to have relatively lower leverage. Apparently, managerial decisions deviate from shareholder wealth maximization and yield a lower debt ratio than the optimal debt ratio. In column (2b) we add the dummy for overinvestment and the interaction of this dummy with leverage.<sup>23</sup> The significantly positive coefficient (at the 10% level) of the interaction term shows that potential overinvestors benefit from leverage. Although our earlier findings indicated

debt avoidance, in case the leverage is present, it disciplines the managers and increases firm value. This conclusion is similar to the findings of McConnell and Servaes (1995) for a sample of US firms.

We find evidence for the relevance of the static trade-off theory of taxation and bankruptcy effects, because the coefficients for non-debt tax shields, collateral value of assets, business risk and firm size are significant and have the predicted sign. We cannot reject hypotheses 1, 2, 3 and 4. We also find avoidance of the disciplining role of leverage in the results for growth opportunities and free cash flow. We reject hypotheses 5 and 6 on self-imposed debt, while we cannot reject hypotheses 8 and 9 on debt-avoidance. Moreover, the dummy variable for overinvestment has a significant coefficient, which is a joint test of hypotheses 8 and 9 that cannot be rejected. We also find results indicating that corporate governance factors affect the avoidance of leverage. Therefore, hypothesis 7 is rejected, while hypothesis 10 cannot be rejected. The finding that leverage affects firm value negatively indicates that hypothesis 11 should be rejected. The interaction term of leverage and the overinvestment dummy shows that hypothesis 11 cannot be rejected for the sub sample of overinvestors. Hypothesis 12 cannot be rejected because of the positive impact of interlocking directorates. In summary, our results indicate that in the Netherlands leverage is prominently determined by tax benefits and bankruptcy costs. Managers of firms with a potential for overinvestment aim to avoid the disciplining role of leverage. Leverage negatively influences firm value, except for firms that are potential overinvestors. Firm value is also influenced by the board structure and by relations with financial institutions.

## 4.5 Robustness analysis

In this subsection we perform a robustness analysis for the regressions in the previous subsection. First we describe the influence of the 2SLS estimation by comparing the results with OLS estimates. Then we investigate the robustness of a one-year lag of the explanatory variables. Besides, we allow for alternative specifications of the explanatory variables. Finally, we investigate the joint impact of governance and overinvestment potential on leverage.

We performed the regression analyses in Tables 3 and 4 using OLS single-equation estimations. The results of the OLS and 2SLS estimations are highly similar (results not reported). Both the coefficients and the significance levels of the coefficients are hardly influenced by the estimation method. The similarity implies that the endogeneity problem of including leverage and Tobin's  $q$  as explanatory variables is of minor importance in our data set.

In our regression analysis we assume a causal relationship in which leverage and Tobin's  $q$  are influenced by variables for financial and governance structure, including leverage and  $q$ . As a robustness test for this assumption we investigate whether a one-year lag of the explanatory variables

alters our findings. We measure the explained variables over the period 1993-1998 (see the variables long-term debt ratio ( $t+1$ ) and Tobin's  $q$  ( $t+1$ ) in Table 2) and the explanatory variables over the period 1992-1997. In this test we explicitly include causality because the explained variables are determined by explanatory variables in the preceding period. The main findings in the regression equations for leverage on the tradeoff between tax benefits and bankruptcy costs and on the potential overinvestor remain unchanged. Also, none of the coefficients of variables that is significant at the 10% level changes its sign. In the regressions, Tobin's  $q$  is significantly positive at the 1% level in each regression and the shareholdings of the financial institutions become insignificant at the 10% level. In the equations for Tobin's  $q$ , the sign of none of the coefficients of variables that is significant at the 10% level changes. The interaction term between the overinvestment potential dummy and the debt ratio becomes insignificant at the 10% level.<sup>24</sup> Although, some of our results are influenced by the one-year lag of the explanatory variables, the key findings are robust to this test.

In addition to the previous analysis we also tested for the robustness to alternative definitions of explanatory variables. Our definition of free cash flow is operating income after taxes, interest and dividend, divided by total assets. The levels of debt and dividend are determined by the firm's management. Therefore, managers may set the levels of debt and dividend such that free cash flow is optimal to them. In this case, the definition of free cash flow should exclude interest and dividends. In order to test the impact of this alternative definition we redefine free cash flow as operating income minus taxes, over total assets. The inclusion of this variable in the regressions in Table 4 does not alter our conclusions. In none of the regressions the alternative definition of free cash flow has a significant coefficient (results not reported).

As a proxy for takeover defenses, we included three dummy variables for the presence of priority shares, preferred shares and depository receipts. Coefficients for these variables were insignificant at the 10% level, in the leverage and  $q$  equations. Through an accumulation of defenses the joint impact of the defenses may be more relevant than the three separate influences. We replace the three dummy variables by the variable 'number of takeover defenses' (see Table 2). Both in the equations for leverage and for  $q$ , this variable remains insignificant at the 10% level (results not reported). The structured regime may also be perceived as a takeover defense. Therefore, we add one to the variable 'number of takeover defenses' if the firm has adopted the structured regime, voluntarily or compulsory. Again, this variable is insignificant in both the leverage and  $q$  equations (results not reported).

In the previous subsections we report the results for the largest outside shareholder, as an approximation for ownership concentration. We replaced this proxy with the shareholdings of the three largest shareholders, but the coefficients remain insignificant at the 10% in the leverage and the  $q$

equations (results not reported). Similarly we report insignificant results for the sum of shareholdings by managerial board member and supervisory board members. These findings do not change when the shareholdings for the two boards are included separately (results not reported). Following McConnell and Servaes (1995), we also tested for a specification that allows for non-linear relationships. Non-linearity may arise in blockholdings as the abilities and incentives may change drastically when shareholders gain control. Therefore we include the shareholdings by board members squared, the largest shareholding squared, industrial shareholdings squared and shareholdings by financial firms squared. Both in the leverage and the  $q$  equation, no significant coefficients are found (results not reported).

Finally, we investigate the joint impact of governance and overinvestment potential on leverage. As Zwiebel (1996) argues, governance mechanisms may force managers of firms with a potential for overinvestment to engage in leverage. Therefore, the impact of governance on leverage may only be present in firms that are potentially overinvestors. As a robustness test we measure the impact of governance on leverage specifically for the sub set of firms that are potential overinvestors. We include in the leverage equations in column (1a) and (2a) in Table 4 thirteen interaction terms of governance variables with the dummy variable for potential overinvestment. The results show that none of the thirteen coefficients is significant at the 10% level (results not reported). This implies that potential overinvestors are not forced by the governance mechanisms to engage in debt to reduce the overinvestment problem.<sup>25</sup>

## 5 Overinvestment and actual investment

In our analysis we use Tobin's  $q$  as an approximation of firm value. We assume that the costs of agency problems between managers and shareholders decrease firm value. Thus, the costs of overinvestment behavior and other actions of the management that are not in the shareholders' interest will result in a lower  $q$ . However, specifically for overinvestment, a more direct measure of the manifestation of agency problems is available. In this section we investigate whether agency behavior is visible in the abnormal investment spending of the firms.<sup>26</sup>

We use a standard investment equation to define the normal investment spending of a firm. We estimate an OLS equation with investment spending (in  $t+1$ ) divided by the replacement value of fixed assets (at  $t+1$ ) as explained variables and Tobin's  $q$  (at  $t$ ) and dummy variables for years as explanatory variables. According to Fazzari, Hubbard and Peterson (1988), in absence of capital market imperfections, Tobin's  $q$  will fully determine the firm's investment spending in a value-

maximizing firm. Similar to Blanchard, Rhee and Summers (1993) we use this  $q$ -model of investment to calculate normal investment spending. The regression results confirm the importance of  $q$ , because the coefficient for  $q$  is 0.15 and has a  $t$ -value of 6.96 (Newey-West heteroskedasticity and autocorrelation consistent). The adjusted  $R^2$  is 0.169. Excess investment is defined as the difference between actual investment and the investment predicted by our  $q$ -model. In other words, excess investment is the error term in the  $q$ -model investment equation.

According to the overinvestment theories, the excess investment of firms is higher for firms with low growth opportunities and free cash flow, i.e. the potential overinvestors. In case leverage has a disciplinary role, leverage will reduce overinvestment. The results of our analysis are presented in Table 5.

[Insert Table 5 here]

In column (1) of Table 5 we use the dummy variable for potential overinvestment to explain the difference between actual investment and predicted investment based on the  $q$ -model. The significant (at 10% level) positive coefficient implies that firms with low growth opportunities and high free cash flow invest more than the  $q$ -model predicts. In column (2) we investigate the influence of leverage on excess investment. The results show that leverage has a significantly (at 1% level) negative influence on excess investment. Note that the significance of the coefficient for potential overinvestment disappears. In column (3) we introduce an interaction term for potential overinvestment and leverage. This test allows us to investigate whether the influence of leverage for potential overinvestors differs from the role of leverage in other firms. The insignificant coefficient for the interaction term indicates that the finding that leverage reduces excess investment is not driven by the sub sample of potential overinvestors. The overall negative effect of leverage on investment is attributed in the literature to financial constraints, due to increased costs of raising external capital (Fazzari, Hubbard and Peterson (1988)). Firms with high leverage may be financially constrained, because external capital is relatively expensive due to bankruptcy costs. In case of a shortage of internal financing, the financial constraint may become binding and reduce investments. Following Fazzari, Hubbard and Peterson (1988), we include free cash flow as an explanatory variable. In their study cash flow is included to measure financial constraints. In column (4) we present the results. Free cash flow has a significant (at 1% level) positive impact on excess investment. This latter finding is similar to the results of Fazzari, Hubbard and Peterson (1988) for US firms and Van Ees and Garretsen (1994) and Degryse and De Jong (2001) for Dutch firms.<sup>27</sup>

In summary, the results for the determinants of excess investment strengthen our conclusion from the previous section that in Dutch firms the disciplinary role of leverage is absent when its role is

most beneficial. In this section we show that, as a result of debt-avoidance, potential overinvestors are not disciplined by leverage. Initially, we find that potential overinvestors are more likely to invest excessively. This effect becomes insignificant when additional variables are included. We then find that the impact of leverage on investment is significantly negative. This effect does not differ between overinvestors and other firms. Because a disciplinary role of leverage would have been exclusively present in potentially overinvesting firms, we cannot attribute the negative impact of leverage to the disciplining role.

## 6 Conclusions

In this paper we test determinants of leverage in a structural equations model. The determinants of leverage are based on the tax/bankruptcy tradeoff and the overinvestment theory. The overinvestment problem investigates the impact on the disciplining role of leverage by growth opportunities, free cash flow and governance characteristics. Besides, in the overinvestment theory, an influence of leverage and governance on firm value is predicted. According to this agency theory, growth opportunities are determinants of leverage. Tobin's  $q$  is the proxy for growth opportunities in most existing studies, including this paper. A simultaneity problem arises, because the agency theories also predict that leverage influences firm value, which is closely related to Tobin's  $q$ . Moreover, governance mechanisms are hypothesized to influence both leverage and firm value. In the empirical model in this paper we explicitly deal with the simultaneous nature of the process of determination of leverage and firm value.

We test the empirical model for a data set of Dutch listed non-financial firms over the period 1992-1997. The institutional setting in the Netherlands accentuates the overinvestment problem, because managers may shield themselves from external control. This is caused, among others, by the presence of highly effective takeover defenses. However, internal control mechanisms are present, such as large blockholders and a supervisory board. This unique data set enables a test of capital structure theories in an institutional setting, which is different from the often-studied US setting. The results allow us to gain a better understanding of the determinants of leverage. Our results show that bankruptcy costs provide important determinants of leverage, i.e. business risk, tangible assets and firm size. As expected, the results for tax effects show a negative impact of non-debt tax shields in leverage. Overinvestment theory, as described by Zwiebel (1996), is confirmed by the avoidance of leverage, when disciplining is required. In addition, governance mechanisms hardly influence leverage. However, we find that shareholdings by financial firms (negatively) and the voluntarily adopted



structured regime (positively) influence leverage. The results also show that for the full sample of firms leverage does not increase firm value. We find that firm value is determined by the supervisory board size (negatively), the interlocking directorates of the supervisory board members (positively) and shareholdings by financial institutions (negatively). Finally, leverage has a positive impact on firm value, for firms that are classified as potential overinvestors. Unfortunately, our other findings indicate that these firms manage to avoid this valuable disciplining role of leverage. In a direct test of the presence of overinvestment we find that leverage is affecting investment negatively, but the effect is present in the full set of firms. Again, this confirms the absence of the disciplinary role of leverage for firms that are potential overinvestors and would benefit most from increased leverage.

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**Table 1: Theoretical relations**

(1) Theories and determinants	Expected relationships	
	(2) Determinants of leverage	(3) Determinants of firm value
Tax benefits		
• non-debt tax shields	<i>H1: negative</i>	
Bankruptcy costs		
• collateral value of assets	<i>H2: positive</i>	
• business risk	<i>H3: negative</i>	
• firm size	<i>H4: positive</i>	
Overinvestment problem: <i>self-imposed debt</i>		
• leverage		<i>H11: positive</i>
• growth opportunities	<i>H5: negative</i>	
• free cash flow	<i>H6: positive</i>	
• effective governance mechanisms	<i>H7: negative</i>	<i>H12: positive</i>
Overinvestment problem: <i>debt avoidance</i>		
• leverage		<i>H11: positive</i>
• growth opportunities	<i>H8: non-negative</i>	
• free cash flow	<i>H9: non-positive</i>	
• effective governance mechanisms	<i>H10: positive</i>	<i>H12: positive</i>

In column (1) four groups of theories are given. Each group is divided into the main components of the model, which can be determinants of leverage, or determinants of firm value, or both. The column indicated by (2) describes the hypotheses about the relationships between leverage and determinants of leverage. The column denoted by (3) gives the hypotheses about the relationships between firm value and its determinants.

**Table 2: Summary statistics**

Variables	Average	Median	St.dev.
Long-term debt ratio	0.132	0.113	0.117
Long-term debt ratio ( $t+1$ )	0.133	0.116	0.117
Tobin's $q$	1.434	1.201	0.815
Tobin's $q$ ( $t+1$ )	1.530	1.239	0.995
Non-debt tax shields	0.026	0.028	0.040
Tangible assets	0.556	0.586	0.203
St. dev. operating income	0.034	0.026	0.031
Total assets	3299m	444m	12124m
Free cash flow	0.030	0.032	0.050
Growth	0.090	0.062	0.168
Listing in UK/US	13.84%	-	-
Potential overinvestment	14.59%	-	-
Board size	8.116	7	3.745
Supervisory board size	5.199	5	2.197
Relative supervisory board size	0.657	0.667	0.109
Interlocks supervisory board	1.110	1.000	0.845
Interlocks managerial board	0.253	0.000	0.489
Interlocks financial firms	1.813	1	2.480
Compulsory structured regime	59.54%	-	-
Voluntarily structured regime	8.72%	-	-
Priority shares	40.00%	-	-
Preferred shares	63.46%	-	-
Depository receipts	38.95%	-	-
Number of takeover defenses	1.42	2	0.78
C <sub>1</sub> outside shareholdings	24.03	15.03	20.24
C <sub>3</sub> outside shareholdings	36.93	31.45	25.83
Shareholdings supervisory board	2.62	0.00	11.76
Shareholdings managerial board	3.75	0.00	13.36
Shareholdings industrial firms	9.98	0.00	20.19
Shareholdings financial firms	11.43	7.12	12.37
Number of observations	665		

The table reports the averages, medians and standard deviations of the variables of the sample of Dutch listed non-financial firms over the period 1992-1997. Long-term debt ratio is long-term debt over the book value of total assets. Tobin's  $q$  is market value over replacement value of total assets, simulated in accordance with the second technique in Perfect and Wiles (1994, p.329). Market value is the book value of total assets minus the book value of common equity plus the market value of common equity. Non-debt tax shields are defined as in Titman and Wessels (1988, p.4). Tangible assets are measured as a fraction of total assets. Total assets is the book value of total assets, expressed per million Dutch guilders (on December 31st, 1997 1 Dutch guilder equals about 0.495 US dollar). The standard deviation of operating income is the standard deviation of the changes of the ratio of operating income and total assets. Free cash flow is operating income, minus taxes, interest expenditures, and dividends, over total assets (Lehn and Poulsen (1989)). Growth is the historical three-year growth rate. Listing in UK/US is a dummy variable with a value of one for firms with a cross-listing at an exchange in the US or the UK, and zero otherwise. The dummy potential overinvestment has a value of one if both Tobin's  $q$  is below the median and free cash flow is above the median, and zero otherwise. Board size is the number of members of the managerial and supervisory board. Supervisory board size is the number of supervisory board members. Relative supervisory board size supervisory board size over board size.

**Table 2: Summary statistics (continued)**

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Interlocks supervisory (managerial) board is the number of interlocking directorates of supervisory (managerial) board members, over the total number of supervisory (managerial) board members. Interlocks financial firms is the number of interlocking directorates with financial firms. Compulsory (voluntarily) structured regime is a dummy variable with the value of one if the firm compulsory (voluntarily) adopted the structured regime, and zero otherwise. The dummy variables priority shares, preferred shares and depository receipts have the value of one if the firm has issued, respectively priority shares, preferred shares or depository receipts, and zero otherwise. Number of takeover defenses is the sum of priority shares, preferred shares and depository receipts.  $C_1$  outside shareholdings is the percentage of shares owned by the largest outside shareholder.  $C_3$  outside shareholdings is the percentage of shares owned by the three largest outside shareholders. Shareholdings of the supervisory board, managerial board, industrial firms and financial firms are the percentages of shares owned by these groups of shareholders. Financial firms are banks, insurance firms, pension funds and venture capitalists. The financial and asset structure data are from the *Jaarboek Nederlandse Ondernemingen* (issues 1992/1993 to 1998/1999) and a data base of the *Centraal Bureau voor de Statistiek* (1974-1997). The ownership data is from yearly publications of notifications for the *Wet Melding Zeggenschap in Het Financieele Dagblad* (1992-1997). The board members are from the *Jaarboek Nederlandse Ondernemingen* (issues 1991/1992 to 1997/1998). Technical takeover defenses and cross-listings are from the *Gids bij de officiële prijscourant van de Amsterdamse Effectenbeurs* (1992-1997). The structured regime data is from *Monitoring Corporate Governance in Nederland 1997* and the firms' annual reports.

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**Table 3: Determinants of leverage and Tobin's  $q$** 

	(1a) Long-term debt ratio	(1b) Tobin's $q$	(2a) Long-term debt ratio	(2b) Tobin's $q$
Non-debt tax shields	-0.577** (-2.48)	-	-0.562** (-2.48)	-
Tangible assets	0.227*** (6.12)	-	0.239*** (6.50)	-
St.dev. operating income	-0.410** (-2.30)	-	-0.106 (-0.54)	-
Tobin's $q$	0.017** (1.99)	-	0.016* (1.92)	-
Free cash flow	-0.116 (-0.60)	-	-0.173 (-1.04)	-
Log (Total assets)	-	-0.066** (-2.26)	0.015*** (3.48)	-0.066** (-2.26)
Log (1+Growth)	-	2.094*** (5.54)	-	2.094*** (5.55)
Listing in UK/US	-	0.748*** (3.43)	-	0.748*** (3.44)
Long-term debt ratio	-	-1.796*** (-5.29)	-	-1.796*** (-5.32)
Adjusted R <sup>2</sup>	0.190	0.238	0.236	0.239

The table reports two-stage least squares regression results for the simultaneous estimation of the determinants of leverage and Tobin's  $q$ . The number of observations is 665, over the period 1992-1997. The explained variables are long-term debt over total assets and Tobin's  $q$ . The explanatory variables are defined in Table 2. Five year-dummies and an intercept have been included; the results are not reported. The symbol \*\*\* denotes that the parameter estimate is significant at the 1% level, \*\* is 5%, and \* is 10% significance level. The  $t$ -values, included in parentheses, are Newey-West heteroskedasticity and autocorrelation consistent.



**Table 4: Determinants of leverage and Tobin's  $q$  including governance variables**

	(1a) Long-term debt ratio	(1b) Tobin's $q$	(2a) Long-term debt ratio	(2b) Tobin's $q$
Non-debt tax shields	-0.642*** (-2.98)	-	-0.614*** (-3.00)	-
Tangible assets	0.230*** (6.12)	-	0.229*** (6.14)	-
St.dev. operating income	-0.129 (-0.61)	-	-0.118 (-0.60)	-
Tobin's $q$	0.014 (1.62)	-	0.011 (1.20)	-
Free cash flow	-0.073 (-0.47)	-	-0.041 (-0.29)	-
Log (1+Growth)	-	1.843*** (4.97)	-	1.835*** (5.17)
Listing in UK/US	-	0.698*** (2.86)	-	0.691*** (2.88)
Long-term debt ratio	-	-1.660*** (-4.72)	-	-1.899*** (-5.02)
Log (Total assets)	0.011** (2.43)	-0.083* (-1.94)	0.012** (2.48)	-0.076* (-1.88)
Relative supervisory board size	0.041 (0.70)	-0.941** (-2.02)	0.049 (0.84)	-0.773* (-1.70)
Interlocks supervisory board	-0.015 (-1.60)	0.153*** (2.78)	-0.016* (-1.67)	0.133** (2.54)
Interlocks managerial board	0.020 (1.55)	0.042 (0.71)	0.019 (1.46)	0.025 (0.43)
Shareholdings board members	-0.028 (-0.10)	-2.040 (-0.83)	0.008 (0.03)	-1.574 (-0.69)
Compulsory structured regime	-0.001 (-0.07)	-0.132 (-1.10)	0.002 (0.11)	-0.112 (-0.98)
Voluntarily structured regime	0.045 (1.85)*	-0.058 (-0.28)	0.043 (1.77)*	0.046 (0.23)
Priority shares	-0.011 (-0.77)	0.006 (0.06)	-0.011 (-0.80)	0.001 (0.01)
Preferred shares	-0.012 (-0.79)	0.022 (0.24)	-0.012 (-0.79)	0.020 (0.23)
Depository receipts	-0.010 (-0.72)	0.051 (0.60)	-0.011 (-0.80)	0.037 (0.45)
C <sub>1</sub> outside shareholdings	-0.011 (-0.03)	0.775 (0.35)	-0.029 (-0.07)	0.681 (0.34)
Shareholdings industrial firms	-0.058 (-0.16)	-0.469 (-0.17)	-0.027 (-0.08)	-0.177 (-0.07)
Shareholdings financial firms	-0.805* (-1.95)	-5.954** (-1.99)	-0.740* (-1.79)	-4.680 (-1.60)
Interlocks financial firms	0.004 (1.09)	-0.037 (-1.56)	0.005 (1.17)	-0.031 (-1.38)
Potential overinvestment	-	-	-0.025* (-1.92)	-0.518*** (-6.05)
Potential overinvestment * Long-term debt ratio	-	-	-	1.252* (1.95)
Adjusted R <sup>2</sup>	0.247	0.251	0.247	0.278

**Table 4: Determinants of leverage and Tobin's  $q$  including governance variables (continued)**

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The table reports two-stage least squares regression results for the simultaneous estimation of the determinants of leverage and Tobin's  $q$ . The number of observations is 665, over the period 1992-1997. The explained variables are long-term debt over total assets and Tobin's  $q$ . The explanatory variables are defined in Table 2. Five year-dummies and an intercept have been included; the results are not reported. The coefficients for variables that measure shareholdings are multiplied by  $10^3$ . The symbol \*\*\* denotes that the parameter estimate is significant at the 1% level, \*\* is 5%, and \* is 10% significance level. The  $t$ -values, included in parentheses, are Newey-West heteroskedasticity and autocorrelation consistent.

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**Table 5: Determinants of excess investment**

	(1)	(2)	(3)	(4)
Intercept	-0.006 (-0.60)	0.024 (1.42)	0.025 (1.37)	-0.001 (-0.04)
Potential overinvestment	0.043* (1.65)	0.036 (1.37)	0.034 (0.96)	0.032 (0.92)
Long-term debt ratio	-	-0.226*** (2.75)	-0.228** (-2.54)	-0.170** (-1.97)
Potential overinvestment * Long-term debt ratio	-	-	0.023 (0.11)	-0.006 (-0.03)
Free cash flow	-	-		0.611*** (2.88)
Adjusted R <sup>2</sup>	0.002	0.010	0.010	0.019

The table reports OLS regression results for the estimation of the determinants of excess investment. The number of observations is 665, over the period 1992-1997. The explained variable is the residual of a regression in which investment in fixed assets over the replacement value of fixed assets in  $t+1$  is explained by dummy variables for years and Tobin's  $q$  in  $t$ . The explanatory variables are defined in Table 2. The symbol \*\*\* denotes that the parameter estimate is significant at the 1% level, \*\* is 5%, and \* is 10% significance level. The  $t$ -values, included in parentheses, are Newey-West heteroskedasticity and autocorrelation consistent.

## Appendix: Comparison of means for potential overinvestors and other firms

Variables	No potential overinvestment		Potential overinvestment		Difference	
	Average	St.dev.	Average	St.dev.	Average	<i>p</i> -value
Long-term debt ratio	0.136	0.119	0.106	0.097	-0.031***	0.007
Long-term debt ratio ( $t+1$ )	0.138	0.119	0.104	0.093	-0.034***	0.002
Tobin's $q$	1.509	0.857	0.993	0.164	-0.516***	0.000
Tobin's $q$ ( $t+1$ )	1.609	1.054	1.067	0.189	-0.543***	0.000
Non-debt tax shields	0.025	0.042	0.031	0.017	0.006**	0.018
Tangible assets	0.551	0.207	0.582	0.176	0.031	0.118
St. dev. operating income	0.035	0.032	0.031	0.020	-0.004	0.142
Total assets	3362m	12526m	2933m	9476m	-428m	0.696
Free cash flow	0.029	0.054	0.039	0.015	0.010***	0.000
Growth	0.092	0.164	0.081	0.191	-0.011	0.596
Listing in UK/US	0.14	0.35	0.10	0.31	-0.04	0.232
Board size	8.12	3.75	8.09	3.72	-0.03	0.948
Supervisory board size	5.15	2.19	5.45	2.24	0.30	0.225
Relative supervisory board size	0.651	0.112	0.688	0.089	0.037***	0.000
Interlocks supervisory board	1.121	0.851	1.046	0.812	-0.075	0.408
Interlocks managerial board	0.263	0.501	0.198	0.411	-0.064	0.170
Interlocks financial firms	1.790	2.451	1.980	2.645	0.190	0.500
Compulsory structured regime	0.57	0.505	0.73	0.45	0.16***	0.002
Voluntarily structured regime	0.10	0.30	0.02	0.14	-0.08***	0.000
Priority shares	0.40	0.49	0.38	0.49	-0.02	0.686
Preferred shares	0.63	0.48	0.68	0.47	0.05	0.302
Depository receipts	0.40	0.49	0.35	0.48	-0.05	0.390
Number of takeover defenses	1.43	0.78	1.41	0.80	0.01	0.876
C <sub>1</sub> outside shareholdings	23.82	20.12	25.24	20.96	1.42	0.536
C <sub>3</sub> outside shareholdings	36.71	26.34	38.19	22.65	1.48	0.562
Shareholdings supervisory board	2.36	10.41	4.16	17.70	1.80	0.334
Shareholdings managerial board	4.05	13.88	1.92	9.58	-2.13*	0.062
Shareholdings industrial firms	9.90	20.47	10.47	18.61	0.57	0.784
Shareholdings financial firms	10.91	12.18	14.47	13.13	3.55**	0.014
Number of observations	568		97			

The table reports the averages and standard deviations for firms defined as potential overinvestors and other firms, and compares the characteristics of the groups of firms. The columns denoted potential overinvestment include firms for which both Tobin's  $q$  is below the median and free cash flow is above the median, while the other firms are in the columns denoted no potential overinvestment. The variables are defined in Table 2. The number of observations is 665, over the period 1992-1997. The column denoted  $p$ -value includes the probability that the difference of the averages of the two groups is not significantly different from zero. The symbol \*\*\* denotes that the difference is significant at the 1% level, \*\* is 5%, and \* is 10% significance level.

## Notes

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<sup>1</sup> Other agency theories, which are related to capital structure are underinvestment, asset substitution and direct wealth transfers (see Jensen and Meckling (1976) and Myers (1977)). The agency problems in these theories arise between shareholders and bondholders. See De Jong and Van Dijk (2000) for a test of these theories. In their study, no confirmation is found for the relevance of these agency theories for Dutch listed non-financial firms.

<sup>2</sup> Corporate governance deals with numerous aspects of the governance of corporations. In the remainder of this study we apply a narrowed definition of corporate governance. We define corporate governance as devices that aim to resolve manager-shareholder problems, such as perk consumption and overinvestment. Shleifer and Vishny (1997) provide an extensive overview of this literature. Moerland (1995) describes the prevalence of disciplinary mechanisms in different corporate systems.

<sup>3</sup> Tax regulations for Dutch companies are similar to regulations in the US (Ministry of Finance (1997)). The corporate tax rate in the Netherlands is 35% of the firm's taxable profits. Depreciation is tax-deductible. Other tax-deductible items are donations and a (very small) investment allowance. Loss-carry backs are allowed over three preceding years, while carry forwards are unlimited. For investors, income tax is levied at a progressive rate (37.5%, 50% or 60%), while an exemption of NLG 1000 exists for both dividends and interest received. In this study, we abstain from including personal taxes. However, if we apply Miller's (1977) framework, which includes both corporate and personal taxes, debt remains beneficial in the Dutch setting.

<sup>4</sup> Bankruptcy regulations for companies in the Netherlands are similar to regulations in the US.

<sup>5</sup> It should be noted that the benefits to the managers of the self-imposed leverage are not explicitly included in the model. Grossman and Hart (1982) mention several reasons for managers to benefit more from bonding than from overinvestment: their salaries depend on the firm's value, a takeover is less likely, and more funds can be raised in the capital markets. In the model, the utility of managers is positively influenced by firm value.

<sup>6</sup> Myers' (1977) underinvestment theory also predicts a negative relationship between growth opportunities and leverage. However, underinvestment differs from overinvestment for at least two reasons. First, underinvestment is an agency problem between shareholders and bondholders, while overinvestment is caused by managers. Second, for an underinvestment problem to arise, a firm needs to have growth options, while overinvestment requires absence of growth opportunities.

<sup>7</sup> The lines of reasoning of Novaes and Zingales (1995) are similar to Zwiebel (1996).

<sup>8</sup> The data start from 1992, because in February 1992 the Law on Disclosure of Shareholdings (*Wet Melding Zeggenschap*) came into effect. This law is the Dutch implementation of the EU Transparency Directive 88/627, which allows us to collect ownership structure data. See De Jong, Kabir, Marra and Röell (2001) for a description of this data set.

<sup>9</sup> We have not included compensation data, because no reliable data is available.

<sup>10</sup> It should be noted that Tobin (1978) refers to marginal  $q$ , which is the  $q$  ratio for an additional project. The empirical implementations of Tobin's  $q$  concern average  $q$  ratios, because marginal  $q$  is unobservable.

<sup>11</sup> The correction hardly influences Tobin's  $q$ . The correlation between Tobin's  $q$  and the uncorrected market-to-book ratio of total assets is 0.997.

<sup>12</sup> We measure the changes in operating income from year  $t-4$  until year  $t$ . For 14 firm-years without data in year  $t-4$  we use the changes in operating income from  $t-3$  until  $t+1$ .

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<sup>13</sup> Lehn and Poulsen (1989) investigate stockholder gains in going private transactions. In our robustness analysis we investigate an alternative definition of free cash flow in which interest and dividend payments are omitted, because these payments are decided upon by the management.

<sup>14</sup> It should be noted that interlocking directorates may also increase board effectiveness. First, the positions on other boards can be used to gather information or influence policies of related firms. Second, board members may have multiple appointments because they are skilled monitors.

<sup>15</sup> See De Jong, Dejong, Mertens and Wasley (2001) for a description and economic analysis of the structured regime in the Netherlands. For legal details, see Slagter (1996).

<sup>16</sup> The list of takeover defenses for the Netherlands in the study is not complete. Voogd (1989) includes the structured regime (44% of the firms), priority shares (53%), preferred shares (51%), binding appointment (49%), limited voting power (6%) and depository receipts (32%), for a sample of 237 listed firms in 1988. Binding appointment is a construction for owners of priority shares that allows them to appoint a board member. In case of a *structuurregime* binding appointments have less power, because they are no longer binding. See Slagter (1996, p.209 and p.231). Limited voting rights limit the maximum voting rights, normally to 1%. Van der Hoeven (1995) includes the structured regime (65% of the firms), priority shares (41%), preferred shares (61%), joint ownership (*gemeenschappelijk bezit*) arrangement (8%) and the Pandora arrangement (2% of firms), for a sample of 135 listed firms in 1992 and 1993. In case of a *gemeenschappelijk bezit* arrangement, the firm's shares are held by a holding company and the shareholders (of the holding) can only influence the policies of the holding, and these do not include the policies of the underlying firm. This result of this construction is similar to depository receipts. The Pandora arrangement covers a group of defenses, that (i) alter the firm into a non-attractive target (for example, the crown-jewel construction, poison pills and golden parachutes); or (ii) disable a takeover through share transactions (for example, the white knight construction, the pac-man construction, buy-outs and cross-holdings). Kabir, Cantrijn and Jeunink (1997) include priority shares (45% of the firms), preferred shares (59%), binding appointment (36%), limited voting power (4%) and depository receipts (40%), for a sample of 177 listed firms in 1992.

<sup>17</sup> Jensen, Solberg and Zorn (1992) test a structural model including equations for leverage, dividend and insider shareholdings using three-stage least squares. Because the authors do not provide OLS estimations we cannot describe the impact of the estimation method.

<sup>18</sup> Our results may be influenced by a disclosure threshold of 5%. Banks, insurance companies and venture capitalists are liable to corporate taxes and can benefit from a tax exemption for stakes above 5% (*deelnemingsvrijstelling*). These firms have incentives to own stakes above 5% and these shareholdings are notified. However, pension funds are not liable to corporate taxes. For this reason, the motive to increase stakes above the lowest notification threshold is absent. This may lead to an underestimation of the shareholdings of pension funds.

<sup>19</sup> Cools (1993) finds that business risk has a significantly negative relation with leverage, while size and collateral value of assets have a significantly positive influence. Rajan and Zingales (1995) find for firms in the G-7 countries that in six out of the seven countries tangibility of assets has a significantly positive effect on a leverage measure in book values. Size is significantly positive in four countries. These findings suggest that the impact of bankruptcy costs is an internationally wide-spread effect.

<sup>20</sup> In case of self-imposed debt the negative relation between shareholdings of financial firms and leverage would have been interpreted as a substitution between two forms of effective monitoring. A similar reasoning would apply to the structured regime.

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<sup>21</sup> For US firms, Smith and Watts (1992) find a significantly negative effect of a market-to-book ratio on leverage. The authors argue that this is caused, among others, by the disciplining role of leverage. Mehran (1992) finds that managerial remuneration and managerial shareholdings induce leverage. Berger, Ofek and Yermack (1997) find managerial shareholdings and option holdings, the presence of blockholdings and total board size to affect leverage positively. Mehran (1992) finds that board structure, firm-bank relations and outside owner do not significantly influence leverage. For the OLS regression on the book value measures, Berger, Ofek and Yermack (1997) find that board composition, CEO tenure and excess compensation have no significant influence on leverage, at the 10% significance level. These findings differ substantially from our findings for the Netherlands.

<sup>22</sup> It should be noted that the insignificantly negative effect of the voluntarily adopted structured regime casts doubts on the interpretation of the positive impact on leverage as effective monitoring.

<sup>23</sup> By definition, the dummy for overinvestment is negatively related to  $q$ , because the variable indicates firms with low growth opportunities, among others. We include the dummy separately in order to correct for this influence in the interaction term.

<sup>24</sup> Regression results are not reported. Next to the changes mentioned, interlocks of supervisory board members in the equation for leverage becomes insignificant at the 10% level in our second simultaneous equation model and relative supervisory board size in the equation for  $q$  becomes insignificant at the 10% level.

<sup>25</sup> In the interaction terms of the governance variables with the dummy variable for overinvestment, Tobin's  $q$  and free cash flow are jointly included in the dummy. We also ran separate regressions for the interactions between the governance variables and both Tobin's  $q$  and free cash flow (results not reported). For the joint impact of  $q$  and governance on leverage we find significant coefficients for insider shareholdings (negative) and the voluntary structured regime, preferred shares and institutional shareholdings (positive). For the interaction of free cash flow with governance we find no significant coefficients for the interaction terms at the 10% level. We applied two definitions of free cash flow, i.e. before and after interest and dividends.

<sup>26</sup> We thank an anonymous referee for this suggestion.

<sup>27</sup> Degryse and De Jong (2001) find that the impact of cash flow on investment is significantly larger in firms with low growth opportunities, relative to firms with high growth opportunities. The authors argue that the strong effect for low growth firms is caused by overinvestment behavior by managers.